I. Project Title: MONITORING THE COLORADO PIKEMINNOW POPULATION IN THE MAINSTEM COLORADO RIVER VIA PERIODIC POPULATION ESTIMATES

II. Principal Investigator(s):

Frank K. Pfeifer, Project Leader
Douglas Osmundson, Fishery Biologist
U.S. Fish and Wildlife Service
764 Horizon Drive, Building B
Grand Junction, Colorado 81506
(970) 245-9319: Fax 245-6933
Frank_Pfeifer@FWS.gov
Doug_Osmundson@FWS.gov

III. Project Summary:

The Interagency Standardized Monitoring Program (ISMP) was developed in 1986 to monitor population trends of Colorado pikeminnow and humpback chub in the Colorado River Basin using catch per effort (CPE) indices. ISMP was expanded in 1998 to include mark-recapture population estimates of the major Colorado pikeminnow and humpback chub populations. For Colorado pikeminnow, CPE data collection continued through 2000 and data were incorporated into those used to develop population estimates. This report summarizes major results of the 3-year effort to develop new population estimates of Colorado pikeminnow in the Colorado River. Data collection efforts by the project biologist have been completed on schedule, all data have been entered and some analyses have already been run. The project concludes in 2001.

IV. Study Schedule: 1998-2001.

V. Relationship to RIPRAP:
Colorado River Action Plan: Colorado River Mainstem
V. Monitor populations and habitat and conduct research to support recovery actions.
V.A. Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions.

VI. Accomplishment of FY 99 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Tasks

1. Capture and mark subadult and adult Colorado pikeminnow in the Colorado River

(mid April-mid June) for mark-recapture population estimates: this task was met.

Background.-- In 1996, a report was completed by Osmundson and Burnham (later published in 1998 in Transactions of the American Fisheries Society 127:957-970) outlining the current status and trend of the Colorado pikeminnow population in the Colorado River mainstem. The authors used a four-year mark-recapture effort to estimate the size of the subadult and adult population. Strong year classes in 1985 and 1986 recruited to the adult population during their 1991-1994 study, allowing the authors to document the large effect that a couple of strong year classes can have on adult population size. In the first year of the study (1991) most adults were found concentrated in the upper reach of the river (upstream of Westwater Canyon) and this population consisted of only about 200 individuals. By 1994, catch rates there had doubled. The 1994 point estimate for the upper reach was about 330 fish; though not double, it was substantially higher than that estimated three years prior. Also, an additional 300 or so young or soon-to-be adult fish were estimated to reside in the lower reach (downstream of Westwater Canyon). Thus, in four years the river-wide population of individuals > 450 mm TL increased from somewhere around 200-250 fish to around 465 fish.

In a 1997 report (later published in 1998 in Transactions of the American Fisheries Society 127:943-956), Osmundson et al. documented the dispersal of these young, recruiting adults in the lower reach and showed that many of these young fish moved to the upper reach. Based on body condition in the lower reach that declined as the fish grew and later improved upon arrival in the upper reach, along with differences in forage between the two reaches, the authors concluded that these upstream movements were related to an inadequate supply of food for adult pikeminnow in the lower reach.

New information from 1998-2000. -- In 1998, a second mark-recapture study was begun to monitor the status of this dynamic population - this time a three-year effort was conducted instead of a four-year effort. In 1998-2000, the same protocol was used as before: three passes, or capture efforts, were made through the upper reach and two passes through the lower reach. With each pass, trammel-netting of backwaters and flooded canyon mouths was used to capture fish during the run-off period. Shoreline electrofishing was also used during periods when backwaters were not sufficiently flooded. Utah DWR and Colorado DOW captures during the sampling periods were included. Captures for the three years were as follows:

Pass	Upper Reach	Lower Reach
	1998	
1	32	31
2	67	65
3	43	--

	1999	
1	52	38
2	65	24
3	55	--
	2000	
1	52	36
2	50	23
3	29	--

The new (1998, 1999 and 2000) population estimates and the earlier (1991-1994) estimates (from Program CAPTURE) are as follows:

		Upper Reach			Lower reach		Whole River
Year	pt. est	95% CI	% >450 mm	pt. est	95% CI	% >450 mm	Total est. >450 mm
1991	205	124-520	95	–	--	8	--
1992	311	179-1204	97	224	not avail	35	380
1993	163	121-246	96	512	not avail	85	592
1994	332	223-728	100	297	not avail	73	548
1991-94	253	161-728	97	344	196-604	64	**465**
1998	435	317-633	97	330	190-665	47	577
1999	367	278-513	97	401	165-1158	53	571
2000	420	267-682	99	596	181-2403	79	890
1998-00	407	not avail	98	442	not avail	60	**664**

Point estimates and length frequency analysis indicate that the whole-river population of fish age-7 and older (> 450 mm TL) increased from about 465 in the early 1990's to 664 in the late 1990's, an increase of 43%. As the 1985-86 cohort ages, the dominate length class increases. During the past three years, the dominant size class has been 600-650 mm TL. Higher numbers and larger average size should provide greater egg production increasing the potential for greater

reproductive output. If proper environmental conditions are provided strong year classes are expected.

Mean catch rates (fish per net) and mean body condition in the upper reach are also provided here to indicate year-to-year trends:

Year	Catch rate (Fish/net)	Condition (Fish 500-599 mm TL)
1991	0.324	101.0
1992	0.487	97.7
1993	0.619	97.6
1994	0.686	98.8
1998	0.966	92.9
1999	0.777	93.5
2000	0.813	92.1

In the upper reach, where most fish are adults, the population estimates and netting catch rates suggest that, beginning in 1992, adult numbers continued to increase, peaked in 1998, and perhaps declined somewhat in 1999. Body condition was relatively stable during the 1991-1994 period but declined significantly by 1998. A preliminary interpretation of declining condition concurrent with increased population size is that food is in short supply and that carrying capacity of the Colorado River may have been exceeded despite the fact that overall population size is small. If subsequent data collection and other studies bear this out, it will have important implications for the potential viability of this population and management activities will need to be directed toward increasing the extent of adult range and the food supply in this river so that this population has the capacity to expand to a more viable population size.

VII. Recommendations: This population should be left alone for three years. In 2004 a new 3-year effort should begin. With this schedule, averaged 3-yr population size estimates will be spaced 6 years apart. This should be sufficient to adequately monitor this population. Stress associated with sampling is probably harmful to this population and sampling therefore should not be conducted every year. Recommendations for management activities based on findings of this and previous studies include:

1) Accelerate providing passage at Price-Stubb and Government Highline dams to increase the amount of adult habitat available to this population.

2) Continue feasibility study for releasing warmer water from Aspinal Unit dams so that Gunnison River water near Delta is suitable for Colorado pikeminnow, with the ultimate goal of increasing the amount of adult habitat available to this population.
3) Implement 15-mile reach, and Aspinal spring flow recommendations to increase the frequency of strong year classes of Colorado pikeminnow in the Colorado and Gunnison rivers.

VIII. Project Status: Project is ongoing and on-track. Field work is completed. A draft report will be completed in mid-2001.

IX. FY 99 Budget

A.	Funds Provided:	45,000
B.	Funds Expended:	45,000
C.	Difference:	0
D.	N/A (BR projects)	
E.	Publication Charges	0

X. Status of Data Submission: Tagging data collected for this project during 1998 and 1999 have been submitted to the database manager; 2000 data will be submitted in January, 2000.

XI. Signed: *Doug Osmundson*, December 2, 1999.

22a-2-99